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THE USL NASA PC R&D PROJECT:

DETAILD SPECIFICATIONS OF OBJECTIVES

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THE USL NASA PC R&D PROJECT:

DETAILED SPECIFICATIONS OF OBJECTIVES

ABSTRACT

This document represents the specifications for a number of tasks which are to be implemented within the USL NASA PC R&D Project. The goals and objectives of the PC development project and the interrelationships of the various components are discussed. Six individual tasks are described. They are a NASA/RECON simulator, a user interface to multiple remote information systems, evaluation of various personal computer systems, statistical analysis software development, interactive presentation system development, and the development of a distributed processing environment. The relationships of these projects to each other and to the goals and objectives of the overall project are also discussed.

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THE USL NASA PC R&D PROJECT:

DETAILED SPECIFICATIONS OF OBJECTIVES

I.   INTRODUCTION

The USL NASA PC R&D Project was initiated in an effort to explore the possible utilizations of personal computers as tools for use by engineers and scientists in the processing of information. Recent advances in personal computer technology and resultant increases in the performance/cost ratio of these machines has made them increasingly attractive replacements for terminals as a method of accessing remote information systems. The information processing capabilities associated with personal computers make them particularly attractive to engineering and scientific personnel who desire both local processing capabilities and access to remote information.

The primary direction of research efforts initiated by the project has been the development of a research environment to be utilized by the project and the development of specifications for a number of activities addressing individual tasks within the

overall scope of the project. The research environment development is a continuous process which includes the evaluation and testing of both hardware and software tools. All specifications are developed with the goal of maintaining maximum flexibility and portability. The environment available for use by project members will therefore continue to evolve over time.

II. GENERAL GOALS AND OBJECTIVES

The purpose of this project is to develop personal computer based tools which will be valuable to scientific and engineering professionals. The following general goals will be used as a framework for these development efforts:

1. Create an environment for PC research and development activities.

2. Develop an integrated PC-based environment for scientific and engineering professionals.

3. Provide PC-Based instructional tools for training in the use of information storage and retrieval systems (IS&Rs).

These goals will be achieved by specifying objectives and initiating tasks to accomplish those objectives. The following is a list of currently identified objectives.

OBJECTIVES:

1. The objectives for establishing a PC R&D environment include:

   1.1 Continually evaluate available PC hardware and software for potential incorporation into the PC R&D projects.

   1.2 Develop procedures and specifications for PC R&D activities.

   1.3 Identify and evaluate candidate research and development projects.

2. The objectives for developing an integrated PC-based environment include:

   2.1 Develop a general means of transporting data between tools in the local environment.

   2.2 Develop applications tools for prototyping an integrated PC-based environment.

   2.3 Develop a general system for transparent sharing and access of resources in a distributed environment.

2.4 Develop a consistent means for accessing resources located in a remote processing environment.

3. The objectives for providing CAI tools for IS&R training include:

3.1 Develop a simulator for Computer Aided Instruction (CAI) in the use of IS&R systems.

3.2 Develop a simulator generator, retargetable for various IS&R systems.

III.   SPECIFIC OBJECTIVES OF INITIATED TASKS

This section describes the status of tasks currently in progress within the PC R&D project and outlines the objectives which each task is intended to accomplish. Each of these tasks is represented by one or more entries in the USL NASA PC R&D Working Paper Series and complete information on the specifications is available in these documents.

3.1   Evaluation of Currently Available PC Hardware/Software

This task addresses Goal 1 Objective 1.1 described in Chapter II. Rapid changes in PC hardware and software technology mandate a continual evaluation of available products in this area. New technological offerings may potentially be incorporated into ongoing R&D efforts or may make previously impractical explorations feasible.

Our primary criteria for evaluation will include qualitative, as well as, quantitative parameters. Qualitatively, we will be concerned with characteristics such as ease of use, documentation quality, training facilities, flexibility, manufacturer support, and maintainability. Quantitatively, we

will evaluate products in terms of benchmark performances, price/performance ratios, compatability with existing systems, reliability, and expandability.

This data will be compared against the results from previous evaluations and used in determining product adaptability to our PC R&D needs.

3.2 Statistical Analysis Software

This task addresses Goal 2 Objective 2.2 in Chapter II. Statistical analysis is a widely used process, especially in an engineering or scientific environment. However, few packages have the potential for integrating with other existing packages for other tasks, or operate in a multiple mode environment.

The USL NASA PC R&D statistical package was designed with computational power, design flexibility, ease of use, efficiency, accuracy, and transportability as the main design goals [Bassari et al., 84]. Multiple mode operation will allow the user to apply the same methods to a stand-alone interactive package, a batch language, and a library package.

The applicability of statistical analysis to other fields such as information storage and retrieval or text processing

makes integration of the statistical package with other packages mandatory. A high degree of cooperation will exist between applications, in order to improve the total workstation efficiency.

The package developed will have the capability of processing requests for one- and two-way statistics, regression analysis, ANOVA, and other facilities required by the user community. In addition, due to a modular design, new local functions can be added without major modifications.

3.3 Prototype Interactive Presentation System

This task addresses Goal 2 Objective 2.2 in Chapter II above. Users in an integrated workstation environment should have access to tools which assist them in all information related job functions. The Interactive Presentation Development System (IPDS) was developed as a tool for a prototype workstation environment in which data will be easily transferred between tools [Moreau, 84b].

IPDS is a very interactive system for creating, editing, and displaying video presentation sequences. It is designed for users with little or no computer experience, and can be used

effectively with just a few minutes practice.

Users interact with IPDS through the keyboard, creating text with normal keys and invoking special functions with ‹alt› combinations and function keys. Once a particular screen is created it can be stored into a screen file for subsequent retrieval .

Script files may be created, containing a list of screen file names to be used in a presentation sequence. Users can step through the sequence forward or backward, focusing attention to areas of the screen with special cursor pointers. Screens may be dynamically modified during the presentation to show assignments or to answer questions, much like a traditional blackboard.

3.4 Distributed Workstation

This task addresses Goal 2 Objective 2.3 in Chapter II described above. The proposed PC-Based Distributed Workstation (PCDWS) prototype will give the users (scientists and engineers) an integrated PC-Based workstation environment for transparent access and sharing of resources available from both local and remote facilities [Chum, 84].

The PCDWS will provide a robust personal computer workstation environment with a comprehensive set of tools as functional components to serve as a scientist's/engineer's R&D workbench. It will also provide distributed/networked workstation intercommunication and uploading/downloading protocols between workstation and remote mainframes as well as between workstations, thus providing access to multiple local and/or remote DBMSs and IS&R systems.

3.5 PC-Based User Interface

This task addresses Goal 2 Objective 2.4 of the Project as described in Chapter II of this document. This objective addresses the provision of a consistent means for accessing resources located in a remote processing environment. This specific task involves the design and prototyping of a common user interface to multiple information storage and retrieval systems [Hall, 84].

A set of design criteria will be developed which will guide the development of an interface system to provide the user with the functionality required to retrieve, store and manipulate data residing in remote information systems. The design will provide the user with a common interface to be used in interaction with

all information systems he wishes to access. The user will therefore "see" all systems through the same interface and will be spared the necessity of learning multiple system command languages and access procedures.

The system will have multi-level capabilities to provide access to users with varying expertise. The user will also be able to utilize the processing capabilities of his personal computer to accomplish whatever local processing of the retrieved information is desired. The system will be designed to allow incorporation of additional systems as the user's needs for information evolve. The interface system is intended to be a part of the larger workstation development project being developed by the USL NASA PC R&D team.

3.6   PC-Based NASA/RECON Simulator

This task addresses Goal 3 Objective 3.1 of the Project, as found in Chapter II. The design and implementation of an information system simulator has many goals and also needs consideration of many factors.

The main goals of an information system simulator can be defined as tools for effective training of users. The increasing

cost of accessing public, remote information storage and retrieval systems, as well as the increased functionality that these systems have aquired in the process of information manipulation makes training expensive as well as neccesary. The simulator can guide the user through a series of complete lessons, if so desied, until he/she is ready for encountering the "real" environment. All this training can be done without expensive costs, at any local PC-based site. Also, in case of advanced usage, the features can be first seen and learned in the simulator, thus increasing the efficiency and improving the cost/performance ratio of the user.

Other goals addressed in the design of such a simulator include prototyping, user/machine interface effectiveness measurement, testing of new search strategies, testing of new procedures, etc.

Research and development will also be performed in the field of information system simulator generators, that will allow parameterization of existing information systems, and simulator generators derived out of these specifications. These systems will be able to simulate a given existing system, as well as prototype a non-existing one for modeling purposes.

IV.   RELATIONSHIPS OF INITIATED TASKS TO GOALS

Figure 1 illustrates the relationship between PC R&D project goals. Each task is identified in the previous chapter as supporting a particular objective of one of these goals.

The PC hardware/software evaluation task is essential in establishing a PC R&D environment. It will not only help us in the selection of initial products, but give us a procedure for evaluating future products.

Both the statistical analysis package and the Interactive Presentation Development System are tools for incorporation in the prototype integrated PC workstation. They provide a testbed for exploring data transfer mechanisms.

The distributed workstation prototype specifications address a distributed environment for transparent sharing and accessing of non-local resources. With the advances of local area network technology, this has become a significant component of the overall integrated workstation design.

The PC-based user interface is the first step in addressing access to remote processing resources. It will deal with problems that must be addressed in all phases of the overall integrated workstation design and so will refine our approach to

others areas as well.

The PC-based NASA/RECON simulator development is intended to fulfill an immediate need of providing a means of training individuals in the utilization of this specific system. It will be a basis for the future development of a retargetable simulator generator for use in training courses developed for other information systems.
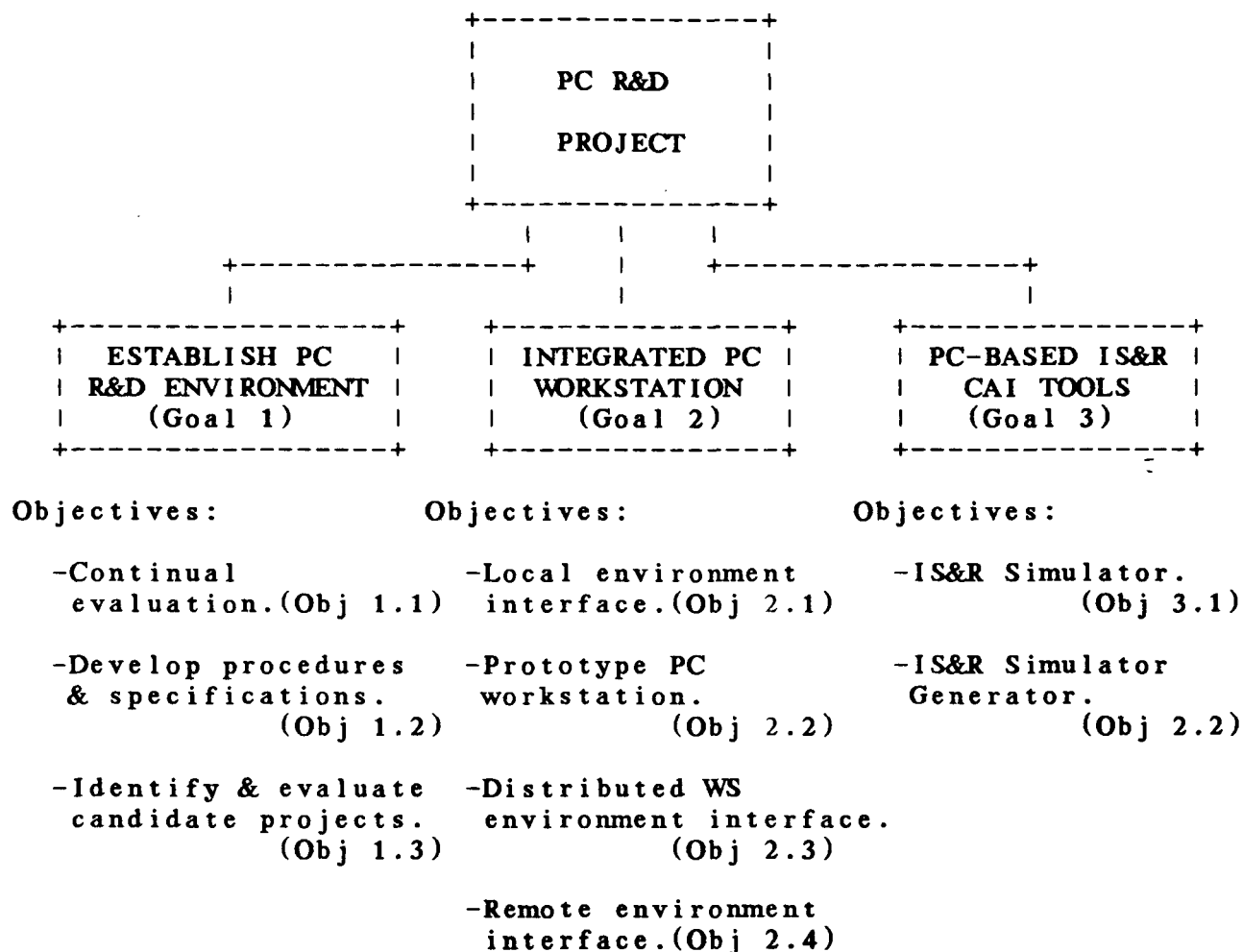
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  |  ESTABLISH PC     |  |  INTEGRATED PC  |  |  PC-BASED IS&R   |
  |  R&D ENVIRONMENT  |  |  WORKSTATION    |  |   CAI  TOOLS     |
  |    (Goal 1)       |  |    (Goal 2)     |  |    (Goal 3)      |
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Objectives: Objectives: Objectives:

  -Continual   -Local environment   -IS&R Simulator.
   evaluation.(Obj 1.1)   interface.(Obj 2.1)   (Obj 3.1)

  -Develop procedures   -Prototype PC   -IS&R Simulator
   & specifications.   workstation.   Generator.
              (Obj 1.2)   (Obj 2.2)   (Obj 2.2)

  -Identify & evaluate   -Distributed WS
   candidate projects.   environment interface.
              (Obj 1.3)   (Obj 2.3)

                         -Remote environment
                          interface.(Obj 2.4)

          Figure 1. Relationship Between PC R&D Goals

V. SUMMARY AND CONCLUSIONS

Each of the tasks described in this document addresses a particular objective of our primary purpose, which is to explore the utilization of personal computer by scientists and engineers in their information processing activities. These tasks will help to establish an environment for addressing our goals, help to refine our perception of the problems to be solved and establish a framework for the initiation of the future tasks of the USL NASA PC R&D project.

VI. REFERENCES

[Bassari et al. 84]   Bassari,   Jinous   and   Spiros
    Triantafyllopoulos,   "General Specifications for the
    Development of a USL NASA PC R&D Statistical Analysis
    Support Package," USL/DBMS NASA/PC R&D Working Paper
    Series, Report Number DBMS.NASA/PC R&D-5, August 2,
    1984, 14p.

[Chum 84]   Chum, Frank Y., "General Specifications for the
    Development   of   a   USL   NASA   PC   R&D Distributed
    Workstation," USL/DBMS NASA/PC R&D   Working   Paper
    Series,   Report   Number   DBMS.NASA/PC R&D-6, August 15,
    1984, 10p.

[Dominick 84] Dominick, Wayne D., "The   USL NASA   PC   R&D
    Project: General   Specifications   of   Objectives,"
    USL/DBMS NASA/PC R&D Working Paper Series, Report
    Number DBMS.NASA/PC R&D-2, June 6, 1984, 6p.

[Hall 84] Hall, Philip P., "Design Criteria for a PC-Based
    Common User Interface to Remote Information Systems,"
    USL/DBMS NASA/PC R&D Working Paper Series, Report
    Number DBMS.NASA/PC R&D-9, August 13, 1984, 21p.

[Moreau 84a] Moreau, Dennis, "The USL NASA PC R&D Development Environment Standards," USL/DBMS NASA/PC R&D Working Paper Series, Report Number DBMS.NASA/PC R&D-3, July 31, 1984, 8p.

[Moreau 84b] Moreau, Dennis R., "The USL NASA PC R&D Interactive Presentation Development System," USL/DBMS NASA/PC R&D Working Paper Series, Report Number DBMS.NASA/PC R&D-7, August 2, 1984, 8p.

[Triantafyllopoulos 84] Triantafyllopoulos, Spiros, "General Specifications for the Development of a PC-Based Simulator of the NASA RECON System," USL/DBMS NASA/PC R&D Working Paper Series, Report Number DBMS.NASA/PC R&D-4, August 2, 1984, 21p.

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16. Abstract

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